



Materials Engineering Branch

TIP*



No. 073 A Low Outgassing Thermal Control Material

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Temperature control via thermal conductance between contacting surfaces employed in aerospace technology is a very important factor to consider when designing hardware. For the last few years this type of thermal control has been accomplished by the use of greases that have been specially formulated to be good thermal conductors; to be stable over a wide temperature range; to be relatively inert chemically and to offer a minimum contamination potential, especially from outgassing. In spite of the research and precautions taken to produce an acceptable product, thermal greases possess a number of inherent problems.

The silicone-based greases ooze out from under edges of modules and creep laterally along surfaces causing a continuing cleanup problem. The available hydrocarbon based products creep to a lesser extent but, in general, are less effective thermal conductors and both types of greases require a well-trained technician to apply them properly. When surfaces must be de-mated for repair, testing or redesign, the greases often offer much resistance to separation and require significant time consuming cleanup and reapplication upon reassembly of the parts.

One solution to the thermal grease problems is a composite sheet material that consists of a silicone rubber filled with thermally conductive materials and, in some cases, glass fibers are added for strength. One such type of material is called CHO-THERM, which is offered in numerous grades by Chomerics¹, of Woburn, Massachusetts. The particular grade that is deemed most appropriate for space flight and vacuum use, when taking all parameters into consideration, is No.1671. This item comes in sheets that are 15 mils thick, pass the outgassing requirements, is strong, resilient and can be reused. It has a thermal conductivity of 107 W/m-K. It is important to know that this material relaxes after pressure is applied and, therefore assemblies must be re-torqued after approximately 24 hours.

¹ A division of Parker Hannifin Corporation.